RESTRICTED CIRCULATION

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Agricultural Memorandum No. 625

Cereal Mildew Spray Dates

C V Smith

1. Data

Figures 1 and 2 are reproduced from the paper by Yarwood and Hami (1974) and show field data for 1973.

Superimposed on these data are the occasions when the criteria of C V Smith (1971) were satisfied at the agro-meteorological stations of Rothamsted and Hoddesdon. These are indicated by vertical lines, on the appropriate date, labelled R and H respectively.

Site locations for the mildew studies were as follows:

Site 1	Gorehambury
2	Digswell
3	Flamstead
4	Brookmans Park
5	Codicote
6	Wareseds
7	Sandridge

2. Discussion

The C V Smith Criteria were developed on the 1970 season data and before spore counts were widely available. They were specifically aimed at locating or anticipating the beginning of the "log phase" of mildew counts on the leaf.

The parameters employed were not selected in an arbitrary way, but were deliberately chosen to obtain some measure of the extent of leaf surface wetness due to condensation (through dew point and grass minimum temperature) and the duration of surface wetness (through sunshine hours and humidity).

For a fungal disease, such environmental factors were taken to be important for successful spore germination (the spores arising from small numbers of initial foci within the crop), and for spore penetration of the host.

The objective reader will note that this represents an important distinction between the C V Smith Criteria and the Polley Criteria which would appear to concentrate on sporulation phase of the second generation of foci. This divergence of opinion is reflected for example in the treatment of certain meteorological elements - the C V Smith Criteria places an upper limit on sunshine amount; the Polley Criteria place a lower limit on sunshine amount.

However, the points at issue at this time are neither the intuitive appeal of the physical reasoning involved of the two Criteria, nor, whether as science based organisations, ADAS and the Meteorological Office can continue to operate with criteria deriving from correlation procedures, as distinct from a more complete understanding of the role of weather in the progress of plant disease

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(cf. Waggoner and Horsfall, 1969). Rather we must concern ourselves with practicalities.

Yarwood and Hami (1974) conclude from the spray timing trials at Site 6 that "the optimal time for spray application is earlier than, not coincident with the major peak of spore release". The highest crop yields were obtained with the earliest spray given (on June 5, 1973).

The evidence is that the C V Smith Criteria, when they are first met at any site of a small monitoring network (on May 30, 1973), anticipate, in almost every case, both the "log phase" of mildew on the leaf and peak mildew spore counts, and by a period of time adequate to warn farmers of the need for preventive measures.

By contrast, the conclusion from applying the full Polley procedure to this 1973 data is that field spraying would have been unlikely to have been achieved before mid June. This date is arrived at as follows.

Polley (in Polley and L P Smith, 1973) concludes that for spring barley, the 4th High Risk Polley period after the beginning of May gives the optimum spray date; for crops adjacent to winter barley the 2nd OR 3rd High Risk period is taken to be more appropriate.

With Polley High Risk Spells at Rothamsted shown as:

May 10–12 1973
May 24–28
June 1–17

The earliest date for spraying thrown up by the Polley Criteria is June 11th, after taking a 5 day interval between June 1–3 (period 3) and June 9–11 (period 4).

Allowing some further time for this information to reach the farming community at large, an effective spray date could not have been much before mid June in 1973.

On a national trial (Polley and L P Smith, 1973) the reported result is that a 56% of occasions when the appropriate sequence of Polley Periods was met, the procedure would have indicated, to within one week, the spray dates that gave the highest yield.

The number of sites examined in this national trial scarcely justifies a success quoted to 1%. An alternative interpretation is that on about half the occasions, the Polley procedure would have led to spraying on dates that were somewhat more than 1 week away from the optimum day (even before allowance for dissemination of the warning). Since on the Polley procedure, the earliest possible date for spraying is May 18, and on general grounds, the most likely date for spraying to achieve optimum results will lie between mid May and mid June, it could be argued that the "success" that follows from applying the Polley procedure is nothing more or less than a statement of the general climate probabilities that show that Polley High Risk days will occur almost continuously from late May and through June.

One should also recall that the success claimed for the Polley procedure is not based on a trial of independent data, (i.e. other seasons) but simply represents the closeness of fit achieved between concomitant meteorological and biological data in the 1972 season.

RECOMMENDATION

The C V Smith Criteria were produced in January 1971 for ADAS Plant Pathologists and the Plant Path Lab, at their request, and on the very limited field data they could make available.

They have chosen not to operate a warning system based on the criteria over the past 4 seasons, but instead have persuaded themselves that additional information (spore count monitoring) would provide the answers they require. The Polley Criteria are the result.

It could be represented that this decision is a classic case of "investment in managerial ego" Drucker (1964) which has already cost the growers of this country hundreds of thousands of pounds.

My recommendation is that the Meteorological Office should not support the Polley requirement for a monitoring system in the 1975 season.

Meteorological Office
CAMBRIDGE

June 1974

REFERENCES

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FIG. 1

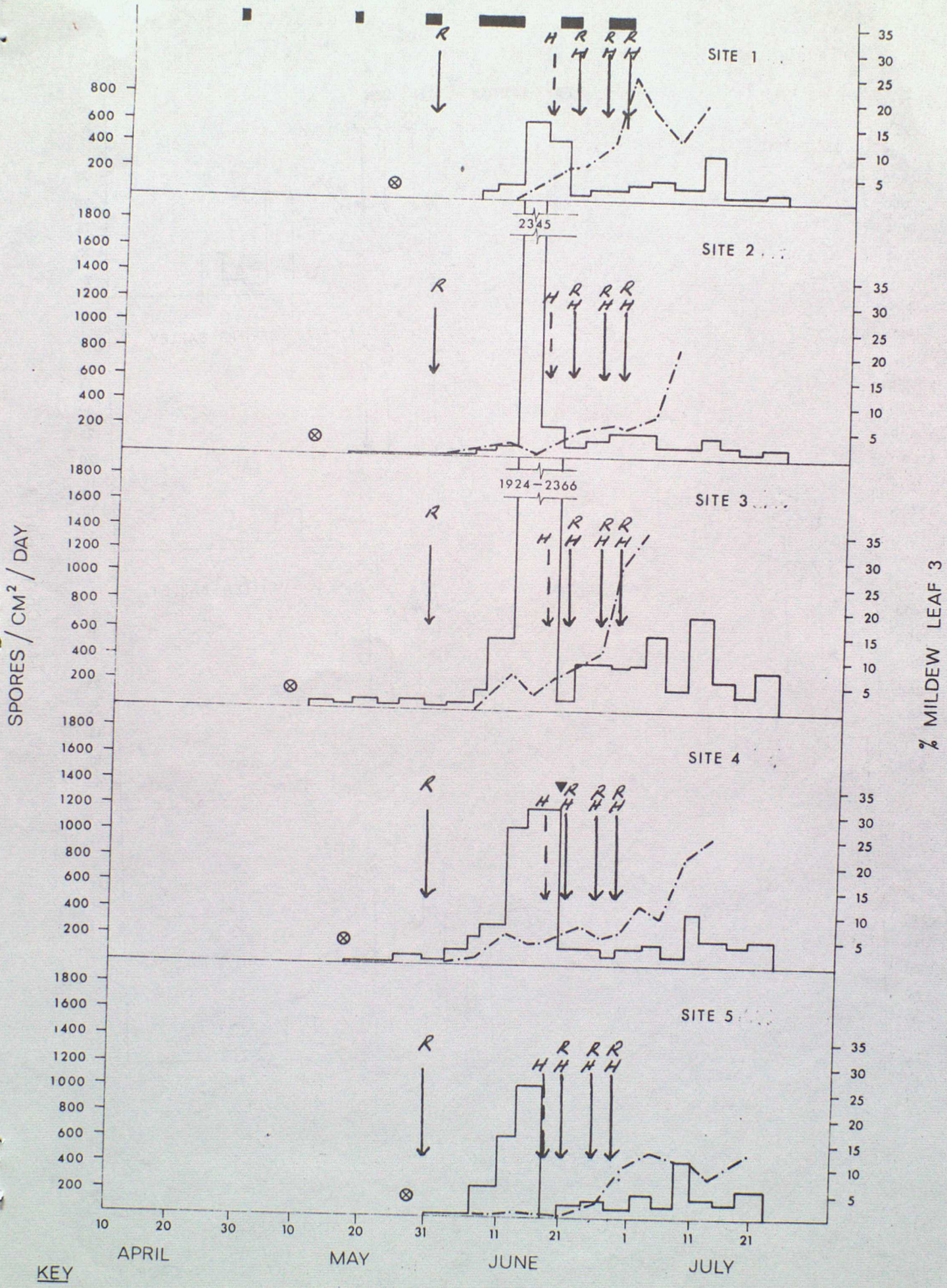
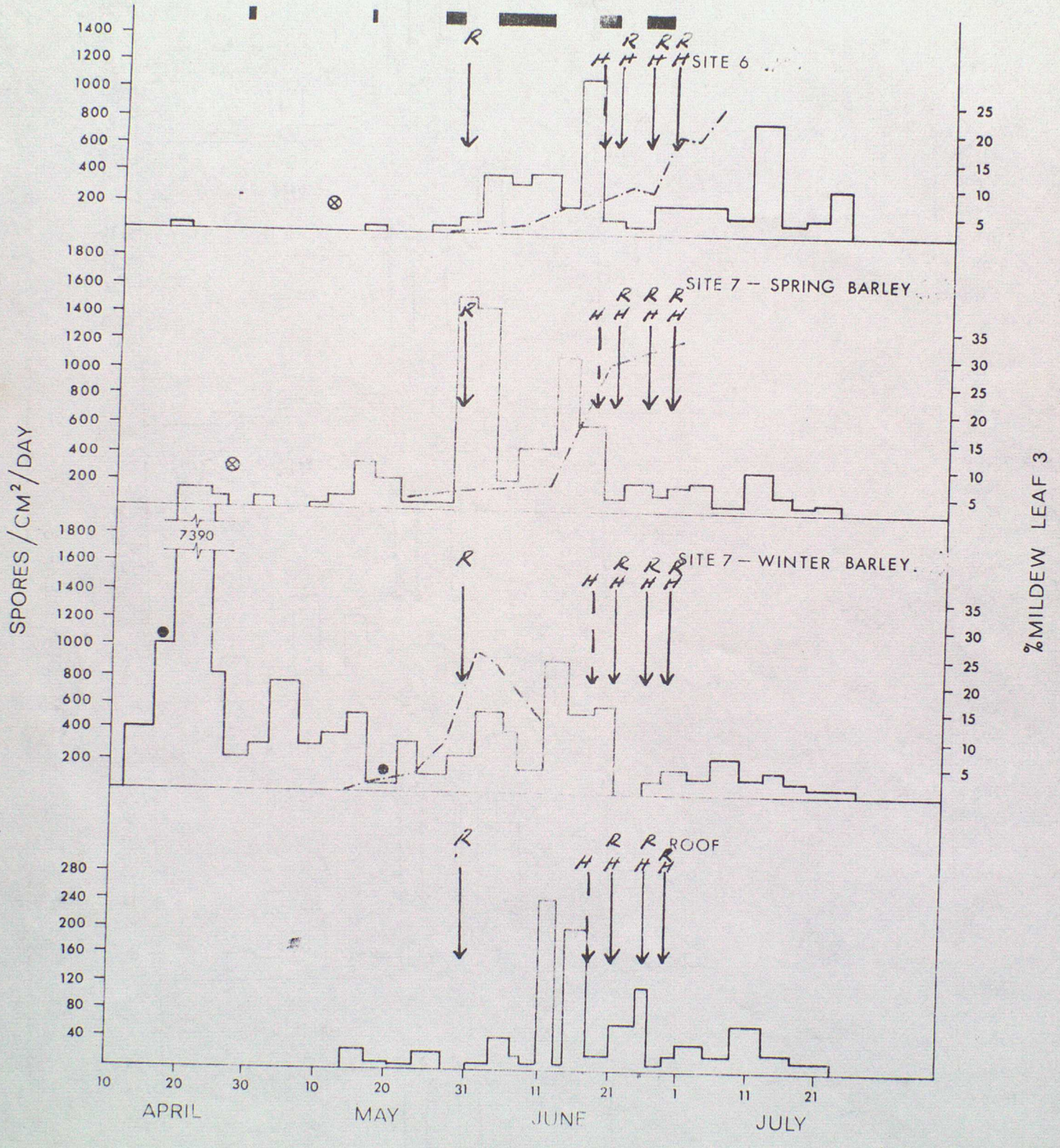

SITE 1
SITE 2
SITE 3
SITE 4
SITE 5
2345
1924–2366
SPORES / CM² / DAY
% MILDEW LEAF 3
APRIL
MAY
JUNE
JULY
KEY
– SPORES
– MILDEW
– MILDEW FIRST SEEN
– CALIXIN SPRAY
– TRAP TOO LOW IN CROP
– POLLEY DAYS

FIG. 2



KEY

— SPORES

— MILDEW

⊗ — MILDEW FIRST SEEN

▼ — CALIXIN SPRAY

● — TRAP TOO LOW IN CROP

▬ — POLLEY DAYS